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Geomorphic Evaluation of the Oak Bend Revetment Site, Mississippi

*by Joseph B. Dunbar, Paul E. Albertson, WES
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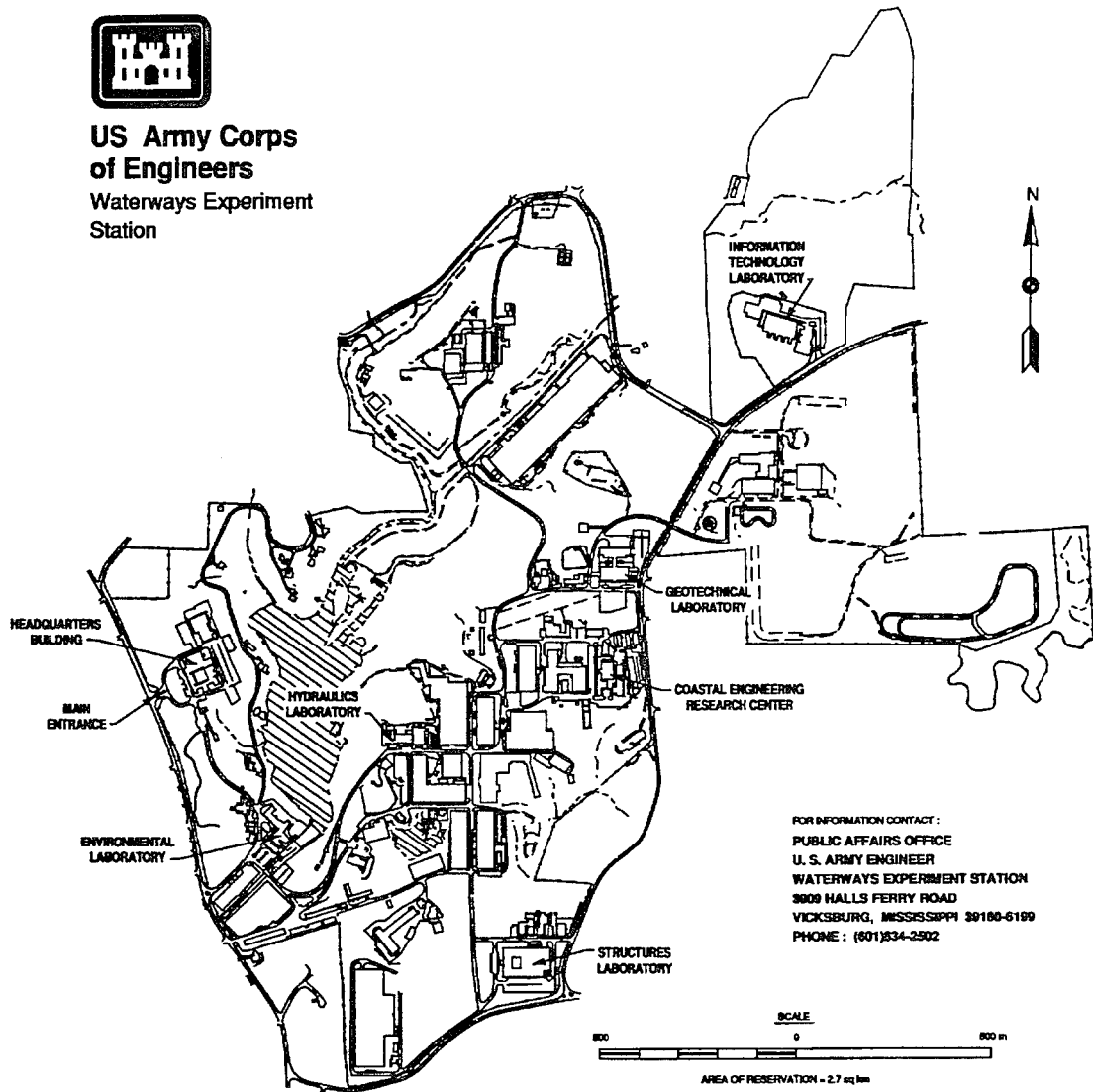
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Preface

The U.S. Army Engineer Waterways Experiment Station (WES) was authorized to conduct this investigation by the U.S. Army Engineer District, Vicksburg (CELMK), on DD Form 448, MIPR No. PD-Q-94-6022 for a geomorphic assessment of a site in the Oak Bend Revetment reach. The site is located on the Mississippi River at Diamond Point, approximately 11 miles south of Vicksburg, MS. Mr. Tad Britt, an archaeologist with CELMK-PD-Q, was the program manager for this study.

This investigation was conducted and the report prepared by Messrs. Paul E. Albertson, Joseph B. Dunbar, and Michael R. Blaes during the period 1 December 1994 to 28 February 1995. Messrs. Albertson and Dunbar are with the Geological Environments Analysis Section (GEAS), Engineering Geology Branch (EGB), Earthquake Engineering and Geosciences Division (EEGD), Geotechnical Laboratory (GL), WES. Mr. Michael R. Blaes, University of Southern Mississippi, Hattiesburg, MS, assisted with compiling of the historic data and the report illustrations. A general field reconnaissance of the study area was conducted by the authors and Mr. Britt (CELMK-PD-Q) on 1 December 1994 and trenching was conducted at mound site 2 by the authors, Mr. Britt, and Dr. Andrew G. Warne (CEWES-GG-YG) on 22 February 1995.

This investigation was performed under the direct supervision of Dr. William F. Marcuson III, Director, GL, and Dr. A. G. Franklin, Chief, EEGD.

Director of WES was Dr. Robert W. Whalin during the publication of this report. Commander was COL Bruce K. Howard, EN.

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Acknowledgment

The authors acknowledge Drs. Fred Briuer and Dwain Butler for their recommendation to conduct a geomorphic study following their site reconnaissance. The authors thank Dr. Mike Robinson, MRC, and Dr. Roger Saucier, Environmental Lab, WES (retired), for their assistance with this study. Dr. Robinson assisted with obtaining historic maps and charts from the MRC map files. Dr. Saucier provided invaluable assistance and many worthwhile discussions about the mounds at the Oak Bend revetment reach. Dr. Saucier also made available to the authors historic photographs from the Diamond Point cut-off which were important sources of data to this study. The authors especially thank Mr. Wesley Lominick, the land owner of the study area, for providing background data about the site and allowing the authors to review his collection of historic maps and photographs.

1 Introduction

Background

The U.S. Army Corps of Engineers, Vicksburg District (CELMK), plans to stabilize a section of the east bank of the Mississippi River in the Oak Bend Revetment reach between river miles 424 and 426. A cultural resource investigation was conducted by CELMK to determine the impact of the proposed stabilization project to the cultural resources in the reach. The archaeological survey of the Oak Bend Revetment reach identified 3 prominent topographic mounds along the left bank of the Mississippi River near river mile 425 (Britt 1994). Scattered prehistoric ceramic and lithic artifacts were found surrounding the northern edge of one of the mounds. As part of the archaeological assessment, Briuer and Butler (1995) performed an archaeological and geophysical reconnaissance of the study area (see Appendix A). This initial survey led to a geomorphic investigation of the mound area.

Purpose and Scope

This report describes a geomorphic investigation of the Oak Bend Revetment reach to evaluate the origin and age of the mounds. The primary purpose of this study is to determine the origin and age of the mounds at the Oak Bend Revetment site. Major objectives of this study are to: (1) identify and map the geomorphic features within the project area, and (2) determine historic flood control and navigation activities that may have impacted the study site.

A secondary purpose for this study is to determine the location of a previously recorded archaeological site that was not found during the cultural resource survey of the project area. Site 22WR611, the Oak Bend Landing site, was reported by C. B. Moore in 1911 to be located along the east bank of the Mississippi River. However, an exact location for this site is not known (Britt 1994).

The scope of this study involves data collection, a summary literature review, geomorphic mapping, selected soil sampling, data reduction and analysis, and report preparation. A major focus of this investigation has been a review of past hydrographic surveys to evaluate historic river migration and

river engineering activities within the study area, and their affect on cultural resource sites.

Study Area

The study area is located on the left (east) bank of the Mississippi River at river mile 425, approximately 11 miles down stream from Vicksburg, Mississippi (see Figure 1a, from U.S. Army Corps of Engineers 1990). The study area is located in Warren County, Mississippi, and includes the Oak Bend revetment reach (i.e., approximately river mile 424 to 427). The mounds are located at the upstream end of Diamond Point cutoff (see Figure 1a, index sheet 76). Diamond Point cutoff is a man-made channel constructed during the early 1930's for flood control and to improve navigation on the Lower Mississippi Valley.

The study area is contained on the northwest part of the Yokena, Mississippi, 1:24,000 U.S. Geological Survey (USGS) topographic quadrangle. A portion (2.5 by 2.5 minute) of the Yokena quadrangle map is presented in Figure 1b (from U.S. Geological Survey 1973) and shows the topography of the mound areas and the locations of the three mounds. Individual mounds are identified in Figure 1b as Areas 1 and 2. Area 1 is the largest of the 3 mounds. Two mounds are present at Area 2. Prehistoric artifacts were found surrounding the northern most mound at Area 2. A complete description of the artifacts and their cultural context is documented by Britt (1994).

Plan of Study and Methods

The major focus of this study involved geomorphic mapping, a field investigation of the study area, and a review of past hydrographic surveys and maps. Geomorphic mapping was limited to only the mound areas. Mapping is based in part on existing geologic data by Saucier (1967). The primary focus of the geomorphic mapping was to identify landforms that are present in the study area and to determine soil development among the different landforms and the mound complex. Historic surveys and maps were another important source of data for evaluating past engineering activities in the study area. Map data were obtained either from the WES or the Mississippi River Commission (MRC) map files.

A field investigation of the study area was made to verify previous geologic surveys and conduct geomorphic mapping to provide general information about soil conditions at the mound area. Two site visits were made to the study area. The first visit was a field reconnaissance on 1 December 1994 and included numerous shallow hand auger borings made in the vicinity of the mounds and surrounding area to obtain general soils data. The second visit to the study area was made on 22 February 1995 and consisted of digging backhoe trenches and drilling supplementary borings, drilled by a Giddings rig.

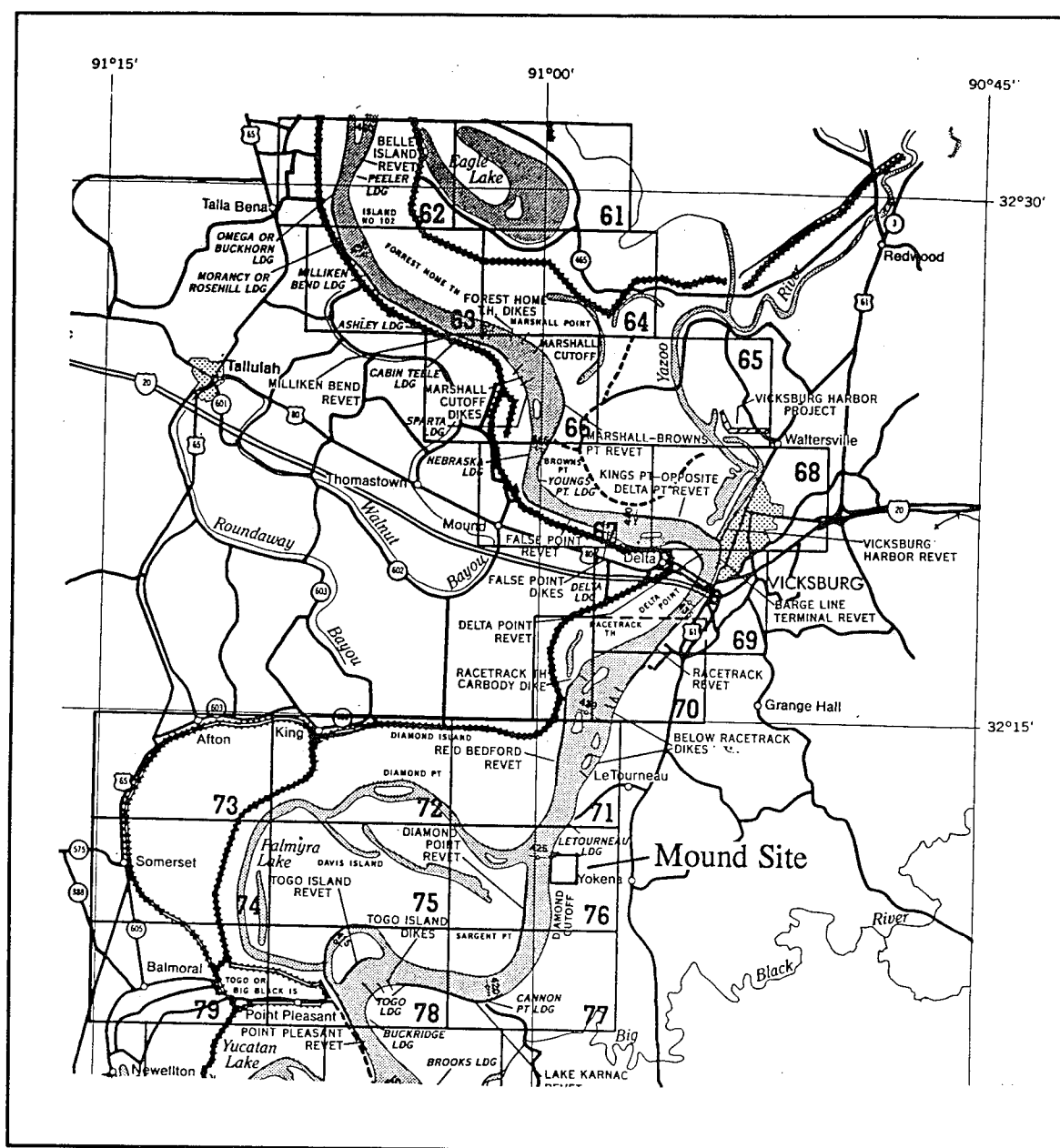


Figure 1a. General location map to study area (from U.S Army Corps of Engineers 1990), see Figure 1b for detailed site map

As part of both site visits, vertical profiles were cut in the river bank as necessary to determine the lithologic and pedogenic composition of the sediments underlying the river bank and the mound surface. Steep river banks and low water at the mound area (22WR647) afforded an excellent opportunity to view large vertical sections of the river bank in order to characterize the underlying soils and their composition.

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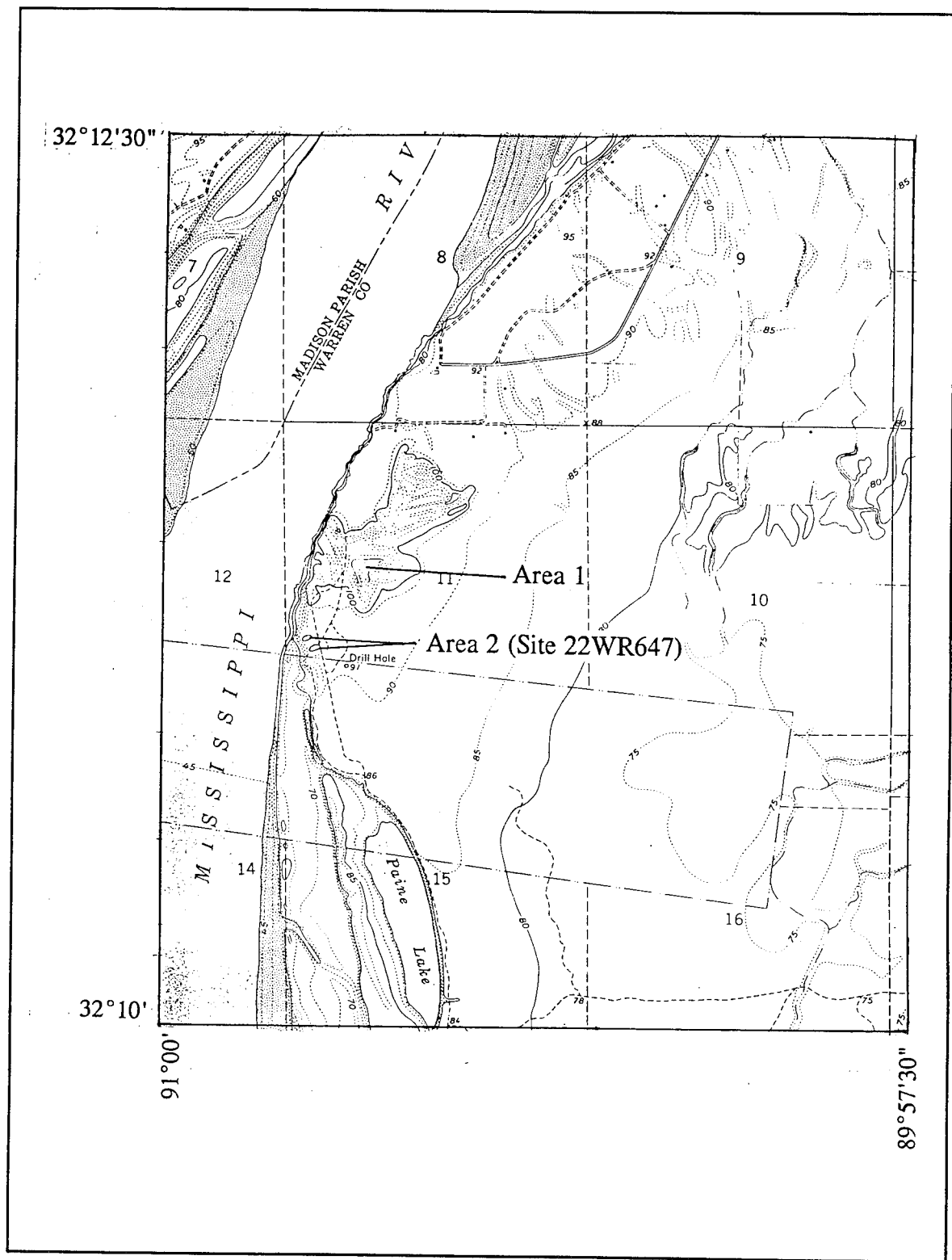


Figure 1b. Location and topography of mound areas

2 Geology and Geomorphology

Geologic Setting

A generalized geologic map of the central Lower Mississippi Valley region in Louisiana and Mississippi is presented in Figure 2 and shows the distribution of the different Mississippi River meander belts (from Saucier 1974). As indicated by Figures 2 and 3 (from Saucier 1974), the Mississippi River has formed 5 major meander belts during the Holocene (i.e., past 10,000 years). A meander belt represents relic fluvial features associated with an abandoned Mississippi River course. A meander belt is characterized by broad natural levees, numerous abandoned channels or oxbow lakes, and associated fluvial deposits (i.e., mainly point bar and backswamp deposits).

The study area is part of the eastern valley margin and the most recent meander belt of the Mississippi River. This area is composed of fluvial sediments deposited during the past 2,500 years as identified by Figure 3.

Site Geology

Previous geologic mapping of the study area has been conducted by Saucier (1967) on a 15-minute (1:62,500 scale) format. Saucier (1967) identified point bar and backswamp sediments within the study area (Figure 4). Sediments comprising these environments are part of the youngest or present Mississippi River meander belt. Geologic cross-sections in Figures 5a and 5b identify a complex fluvial stratigraphy consisting of 50 to 100 ft (15 to 30 m) of Holocene Mississippi River sediments overlying Tertiary (65 to 2 million years) marine sediments. Beneath the mound areas, the geology consists of approximately 75 ft (23 m) of natural levee and backswamp sediments overlying Tertiary limestone (Figure 5a). Boring logs from cross-section A-A' (Figure 5a) are presented in Appendix B. Depositional environments present in the study area and shown in Figures 4, 5a, and 5b are described in more detail below.

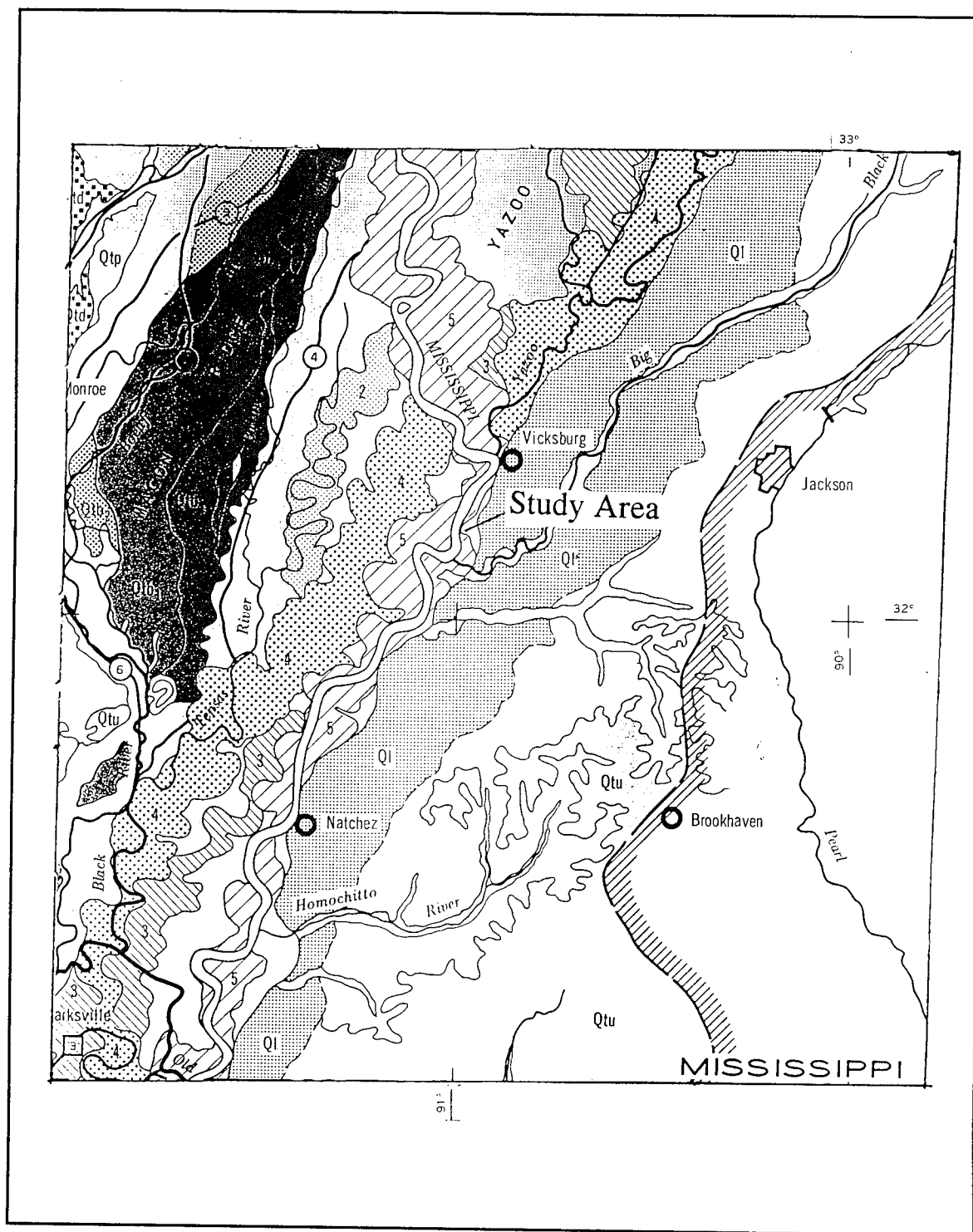


Figure 2a. Generalized geologic map of central part of Lower Mississippi River Valley, Louisiana and Mississippi (from Saucier 1974). Legend in Figure 2b.

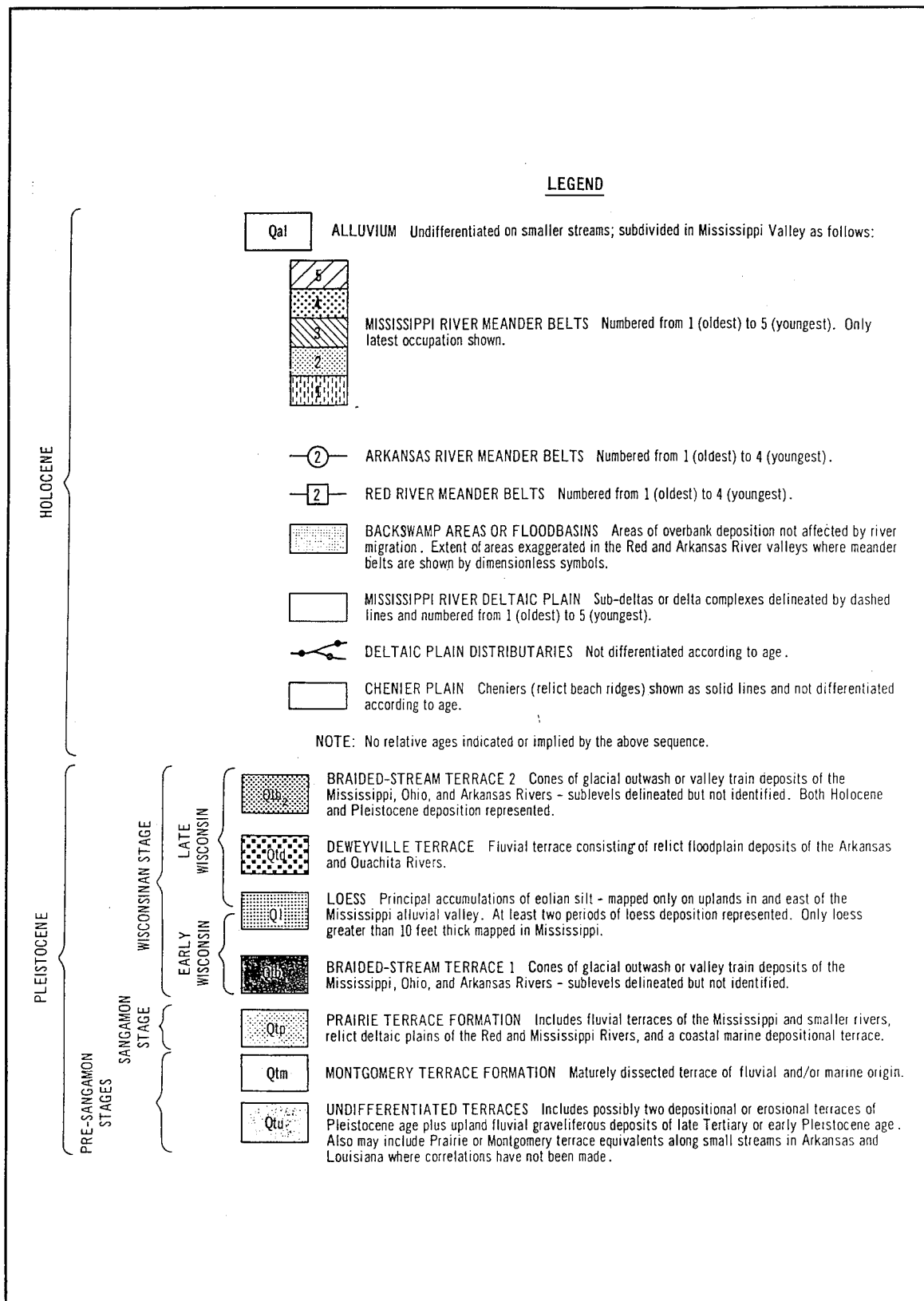


Figure 2b. Legend to geologic map in Figure 2a